Another wet September/October and once again drainage is foremost in Head Greenkeepers'/Course Managers' minds. A fact borne out by the number of enquiries for the installation of land drainage systems to golf course fairways says Nigel Wyatt, Director of M J Abbott Ltd.

THE DRAIN GAME

Any golf course which is excessively wet will impose limits on the availability and quality of play. In addition a wet golf course will affect grass growth and development restricting maintenance operations.

The benefits of good drainage include the following:

- Removal of excessive moisture and the lowering of the water table.
- Improvements to the quality, firmness and durability of the turf increasing wear tolerance.
- Quicker drying of the ground surface, extending possible playing and maintenance time.
- Subsequent prevention of damage to the soil structure through machinery and pedestrian traffic.
- Prevention of erosion and collection of surface water run off.
- Improvements to the soil structure and air movement within the soil preventing restriction of plant root development.
- Increased root development and improved bacterial action.
- Increased capillary moisture in dry weather promoting improved drought resistance.
- Higher soil temperature earlier and later in the year giving a longer growing season.

The need for good drainage on golf courses cannot be disputed.

Courses built upon naturally free draining soils may only require basic drainage systems to carry water from features within the golf course, i.e. golf greens, tees, bunkers and hollows within fairways.

Courses built on heavier soils will require much more work and expenditure to provide satisfactory drainage.

A primary piped system is the basis for all golf course drainage. The introduction of drainage systems incorporating perforated plastic pipe will play an essential role in the part of removal of excess water quickly.

The piped systems usually consists of a main drain installed at the edge of a fairway within the semi rough/rough with lateral drains connecting into the main drain at 5-10m spacings in a grid formation depending on the slope of the land. Lateral drains should always cross the natural slope of the land in order to intercept ground water moving naturally through the soil. If ground levels demand it the main drain may be installed within a fairway with lateral drains connecting into the main in a herringbone formation.

Main drains - typically 200mm-100mm diameter depending upon the catchment area should be laid within trenches excavated cleanly to a depth of 900mm-600mm generally. Pipes are laid on a formed trench bed. The pipe is then surrounded and the trench filled to within 150mm of the surface with an approved clean stone. The stone is generally blinded with grit and the trench filled to the surface with an approved coarse sand, ensuring no migration of fines through the gravel. It is common to use a capping mix of rootzone to dress the trenchlines, providing a medium in which grass seed can grow enabling quick establishment.

Lateral drains typically 100mm-60mm diameter depending upon the spacings should be laid within trenches excavated cleanly to a minimum depth of 750mm-450mm generally and backfilled in the same manner as main drains. It is a fact that natural settlement may occur over the trenchlines, therefore continued work may be necessary in order to maintain surface levels.

There is no doubt that a piped drainage system alone can dramati-

cally improve conditions on very wet sites with heavy soils or where there is a high water table in more permeable soils. Primary piped systems may also provide the infrastructure for any subsequent secondary drainage operations.

Having provided the means for the transportation of soil water, it may be desirable to make provision for the quick removal of surface water.

The restricting factor for the removal of surface water is often the impermeability of the subsoil/topsoil compaction and smearing of the surface.

A number of secondary drainage operations are available.

Gravel/sand slitting involves the excavation of narrow trenches typically 65mm-50mm wide to an average depth of 250mm. The slits are installed generally 2m-1m spacings and installed perpendicular to the primary lateral drains. Trenches are filled with gravel to within 50mm of the surface topped off with coarse sand.

Gravel banding involves the installation of narrow bands of grit, typically 20mm wide to an average depth of 200mm. The bands are installed generally at 0.4m spacings, perpendicular to the primary lateral drains.

Each secondary system intercepts surface water conveying it and discharging to the permeable fill within the lateral drains.

Top dressing on very wet sites should form part of an ongoing maintenance programme to ensure the continuing effectiveness of the drainage systems.

A primary piped drainage system should be carried out only when ground and weather conditions are suitable i.e. reasonably dry and firm. Typically the works will affect at least one fairway which will have to be closed during the installation of the system. Clearly timing is crucial, particularly as the works will affect play on the golf course. It is common that a Golf Club's calendar of events dictate when works may commence.

However, it is risky to expect works carried out later in the season to be completed. If weather and ground conditions deteriorate there is a possibility that the work may not be completed and the benefits of the works will be lost for another year. An old colleague of mine has always said you cannot make an omelette without cracking the eggs!

Therefore it must be stressed to Managers/Committees that some disruption to play is inevitable for the successful completion of the system.

The installation of a land drainage system within a new or established golf course requires a combination of the correct experience together with the correct installation equipment.

Land drainage machinery for use on golf courses is often specialised, developed for its purpose by the contractor together with machinery manufacturers over a number of years.

Trenching machinery, either tracked continuous chain or tractor mounted continuous wheel should be fit for the purpose of excavation on fine turf.

Typically, trenchers include the provision of soil loading conveyors, therefore excavated soil is loaded directly onto dumpers preventing contamination of the playing surface.

THE DRAIN GAME

Trenchers should be fitted with an automatic laser levelling device enabling accurate grading of each pipe run. Pipes are laid on a formed trench bed through a chute attached to the trenching machine. Typically, gravel is placed around the pipe and the trench filled to the correct level by the use of a hopper attached to this pipe laying chute in one continuous operation. All wheeled equipment including the soil removing dumpers and gravel fill front/side discharge trailers should be fitted with low ground pressure tyres fit for use on turf to prevent disruption to the playing surface.

It is important then that faced with the problem of poor drainage that the correct steps are taken to solve the problem.

Planning is all important. You may already know or have had referred to you a reputable contractor to assist with planning design and costing of the works. Should you require a number of quotations, three would be the norm, then contact the Land Drainage Contractors Association Sports Turf Division. Members of the Association are individually vetted on their ability to carry out such works. Ask your chosen contractor for references of a similar project and take them up.

An alternative route may be to engage the services of a Consultant. You will receive unbiased advice and design from them at a cost. Consultant charges depend upon the size and nature of the project and their level of involvement may vary between 5% and 15% of the contract cost.

Ever increasing standards of maintenance and playability are expected in today's society. A key factor in the success of any venue is the ability to remove water quickly and efficiently. Contact the experts.

As one of the U.K.'s leading specialised contracting companies, M J Abbott Ltd have a long history of land drainage installations.

Established in the 1960's, the company has grown to become one of the country's leading specialists in golf course drainage. The company offers a complete land drainage design service comprising feasibility studies, system design, production of plans and cost estimates.

The company operates an extensive range of specially adapted laser controlled trenchers and associated equipment which enable the efficient installation of primary piped and secondary drainage systems.

Nigel Wyatt - Director - M J Abbott Ltd - 01722 716361